PHOSPHATE ROCK

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Phosphorus is an essential element for plant and animal nutrition and is consumed primarily as a principal component of nitrogen-phosphorus-potassium (NPK) fertilizers. Phosphate rock minerals are the only significant global resources of phosphorus. Worldwide, the United States is the leading producer and consumer of phosphate rock, and the leading producer, consumer, and supplier of phosphate fertilizers. Unless otherwise noted, mine production is reported in terms of marketable production, which refers to beneficiated phosphate rock that has a suitable phosphorus pentoxide (P_2O_5) content suitable for phosphoric acid or elemental-phosphorus manufacturing.

In 2003, the U.S. phosphate industry showed a slight improvement, with consumption of phosphate rock and production of phosphoric acid both increasing. Total export sales of phosphate fertilizer, in terms of P_2O_5 content, rose based on the strength of monoammonium phosphate (MAP) exports, which offset lower diammonium phosphate (DAP) exports (tables 8, 9).

Mines in Florida and North Carolina accounted for 86% of domestic production of marketable phosphate rock. The remainder was produced in Idaho and Utah (table 3). More than 95% of phosphate rock consumed was used to manufacture wet-process phosphoric acid for animal feed, chemical applications, and in fertilizer. One company in Idaho mined phosphate rock for elemental phosphorus production.

According to the U.S. Census Bureau (2004), production of phosphoric acid increased slightly compared with that of 2002 to 11 million metric tons (Mt) of P_2O_5 content. Census data for thermal phosphoric acid production were combined with wet-process phosphoric acid to avoid disclosing company proprietary data.

Domestic Data Coverage

Domestic phosphate rock production data were developed by the U.S. Geological Survey (USGS) from monthly and semiannual voluntary canvasses of all companies that owned phosphate rock mines. All companies responded to the canvass in 2003. Production was reported from 13 mines, and 2 mines were closed for the entire year (table 2).

Legislation and Government Programs

On November 12, the Governor of Florida signed into law a revision to the State’s Phosphate Reclamation Fund that included an increase in the severance tax on each short ton of phosphate rock produced to pay for the remediation of phosphogypsum stacks formerly owned by Mulberry Corporation. On January 1, 2004, the tax rate increased to $1.62 per short ton from $1.30 per short ton. The Florida Phosphate Council and all active phosphate mining companies in Florida recommended a rate increase in early 2003, and the bill was passed in a special session of the legislature in October. The legislation was necessitated by the rapid depletion of the fund established to pay for phosphate reclamation in the State. In 2000, the Florida Department of Environmental Protection (FDEP) was forced to act quickly to stabilize the phosphogypsum stacks at the plants in Piney Point and Mulberry, FL, after Mulberry filed for bankruptcy and abandoned the facilities. In 2002, Cargill Crop Nutrition (a business unit at Cargill, Incorporated) purchased the Mulberry facility and began to close the phosphogypsum stacks; however, the State of Florida retained ownership of the stacks and was expecting to pay for the remediation (Green Markets, 2003d).

The new law also included funding for a water quality study of the Peace River watershed, the allocation of additional funds for phosphate-related expenses to counties that have active mines, and the imposition of strict penalties on companies that misstate their financial ability to pay for closure of a gypsum stack (Green Markets, 2003f).

Production

In 2003, phosphate rock production fell by 3% from the previous year to 35 Mt owing to the indefinite closing of a mine in Idaho, the 4-month closure of mine in Florida, and high stocks of phosphate rock. In terms of regions, production of marketable phosphate rock in both the Florida-North Carolina and Idaho-Utah areas fell by about 3% (table 3). Mine capacity utilization was 80% in 2003, which was slightly less than in 2002. Data were grouped by region rather than by State to avoid disclosing company proprietary information.

Florida accounted for about 75% of domestic production and about 20% of world production, which was greater than any other country in the world (Florida Phosphate Council, 2003). The largest economic deposits and production facilities were located in central Florida, in the counties of Hardee, Hillsborough, Manatee, and Polk. Three companies, Cargill Crop Nutrition, CF Industries, Inc., and IMC Phosphates MP, Inc., operated seven mines in this area. Another mine, owned by PCS Phosphate Co., Inc., was located in Hamilton County in the northeastern part of the State (table 2). In addition, PCS operated a mine and phosphoric acid/fertilizer plant in Aurora, NC.

IMC Phosphates, the leading producer of phosphate rock and fertilizer products, closed its Fort Green Mine from January 29 to April 30 to reduce stocks (IMC Global Inc., 2004). The permitting process for the company's proposed Ona Mine in Hardee County was proceeding. The FDEP issued an "intent to permit" notice in January, which was subsequently challenged by the Peace River-Manasota Regional Water Authority. The Water Authority and local governments south of the proposed mining expansion were opposed to new mining because of the potential for adverse effects to the Peace River, a major source of drinking water for southwestern Florida. A final ruling on the permit was expected in mid-2004 (Green Markets, 2003e).

Cargill filed a "plan of study" with the Central Florida Planning Commission to expand its South Fort Meade Mine by 4,860 hectares (ha). This is the first step required in the permitting process for phosphate rock mines. Upon completion of the study, which can take up to 1 year, Cargill can apply to the FDEP for a mine permit. The expansion would increase its production capacity by 2 million metric tons per year (Mt/yr) and would extend the mine from the current location in Polk County into Hardee County. Cargill intended to mine in the new area between 2008 and 2010 (Green Markets, 2003b).

Cargill acquired the Wingate Creek Mine in Manatee County from Nu-Gulf-Wingate Holdings, LLC (an affiliate of Crédit Agricole Indosuez), which was the holding company for bankrupt Mulberry Corporation, the former owner of the mine. The mine, which was closed in 1999, has a rated capacity of 1.45 Mt/yr and was the only phosphate rock mine in the United States to use dredge mining exclusively. The parties completed the transaction in March 2004, and Cargill had to apply to have the mining permits transferred from the previous owner (Cargill Crop Nutrition, 2004). Cargill expected to begin development of the Pioneer Mine in Hardee County, which it obtained from Farmland Industries, Inc. in 2002, after it completed the permitting procedure for the South Fort Meade expansion (Green Markets, 2003b).

In 2003, four mines were active in the Western Phosphate Field; three were in Idaho, and one, in Utah (table 2).

In Idaho, phosphate rock was mined in Caribou County by Nu-West Industries, Inc. (a subsidiary of Agrium US, Inc.), P4 Production LLC (a subsidiary of Monsanto Co.), and J.R. Simplot Co.

Astaris LLC (a joint venture between FMC Corp. and Solutia, Inc.) closed its Dry Valley, ID, phosphate rock mine and purified-phosphoric-acid plant in 2003. The mine was closed in January to reduce the stockpile of phosphate rock that had accumulated since the closure of the Astaris Pocatello, ID, elemental phosphorus plant in 2001, and the subsequent transition to manufacturing high-purity phosphoric acid. In October, Astaris began a corporate restructuring program that closed the Conda, ID, high-purity phosphoric acid plant, which it had operated in a joint-venture agreement with Agrium US, Inc. The Green River, WY, sodium tripolyphosphate facility, which was supplied exclusively by the Conda plant, was also included in the plant closures. Astaris cited increased foreign competition, excess world capacity, weak economic conditions, and rising imports as reasons for the closure (Green Markets, 2003a). The Conda plant, phosphate rock ore reserves, and other associated Astaris assets were acquired by Agrium. Agrium did not plan to manufacture high-purity phosphoric acid and planned to use the facility to supplement its existing wet-process phosphoric acid plant at the same location (Agrium Inc., 2004).

Agrium received approval from the U.S. Bureau of Land Management (BLM), the U.S. Forest Service, and the Idaho Department of Lands (IDL) to expand its Rasmussen Ridge Mine in Caribou County. Agrium planned to expand the mine by 109 ha, of which 81 ha would be mined, with the remainder used for roads and storing ore stockpiles. The Rasmussen Ridge Mine is located on land administered by the IDL and the U.S. Forest Service; however, the BLM is responsible for mineral leasing management (U.S. Bureau of Land Management, 2003).

In Utah, following the bankruptcy of Farmland Industries, Inc., Simplot acquired Farmland's 50% share of SF Phosphates LLC (a joint venture between Simplot and Farmland). Simplot gained full ownership of the Vernal Mine in Uintah County, a phosphoric acid/fertilizer plant in Rock Springs, WY, and the 155-kilometer pipeline used to transport phosphate rock concentrate slurry from the mine to the plant (Green Markets, 2003c).

Consumption

Owing to higher phosphoric acid production, domestic consumption of phosphate rock increased to 38.8 Mt in 2003 from 37.4 Mt in 2002 (table 1). Phosphate rock sold and/or used as reported by the mining companies rose to 36.4 Mt in 2003 from 34.7 Mt in 2002 (tables 1, 4). Wet-process phosphoric acid manufacturing consumed more than 95% of reported domestic phosphate rock usage and sales. The remainder was used to produce elemental phosphorus or sold for direct application to soil.

The domestic phosphate industry is mostly vertically integrated, with the exception of four phosphate fertilizer producers that do not own mines. The leading producer of processed phosphates was IMC Phosphates, which had phosphoric acid and fertilizer plants in New Wales and South Pierce, FL, and Faustina and Uncle Sam, LA, for a total production capacity of 3.66 Mt/yr of P_2O_5 (IMC Global Inc., 2003). The company's DAP facility in Taft, LA, closed in 1999. The firm closed all Louisiana operations from late May to early August, when it restarted only the Uncle Sam acid plant and the Faustina DAP and ammonia plants (IMC Global Inc., 2004).

The second leading producer of processed phosphates was Cargill, which operated three facilities in Florida with a total capacity of 2.45 Mt/yr. PCS Phosphates was third with at capacity of 2.3 Mt/yr, followed by CF Industries with 1.05 Mt/yr (IMC Global Inc., 2003). In the Western United States, there were two producers of processed phosphates—Simplot with locations in Pocatello and Rock Springs and Agrium in Conda. Astaris operated its purified phosphoric acid plant well below its rated capacity before closing it in October.

Agrifos Fertilizer LLC, Pasadena, TX; Mississippi Phosphates, Inc., Pascagoula, MS; and PCS Nitrogen, Geismar, LA, all imported phosphate rock from Morocco to manufacture wet-process phosphoric acid. U.S. Agri-Chemicals (a subsidiary of Sinochem of China) purchased phosphate rock from IMC to produce phosphoric acid and fertilizers at its two plants in Florida.

Elemental phosphorus production data were withheld by the U.S. Census Bureau to protect company proprietary data. Monsanto Co. operated the only elemental phosphorus plant in the United States in Soda Springs, ID. Thermal phosphoric-acid production data, one of the primary applications for elemental phosphorus, were withheld by the U.S. Census Bureau. Phosphorus trichloride (PCl_3) has become the leading end use for elemental phosphorus, with about two-thirds of PCl_3 used to manufacture glyphosate-base herbicides (Mannsville Chemical Products Corp., 2001). Worldwide, phosphorus production has been replaced in many regions by purified wet-process phosphoric acid to reduce operating costs. The only other operating elemental phosphorus facilities in the world are located in China, Kazakhstan, the Netherlands, and Russia (Phosphorus and Potassium, 1999).

The United States is considered a mature market for phosphate fertilizers, with an average consumption of 4 Mt/yr. Data for 2003 showed an 8% decrease in consumption from 2002, which followed a 9% increase from 2001. The large increase in 2002 was attributed primarily to reporting errors in certain States; however, corrected data were not available for 2002. In 2003, Iowa, Minnesota, Illinois, Nebraska, and California, in descending order, were the leading consumers of phosphate fertilizer (Terry and Kirby, 2004, p. 15-16).

Stocks

Stocks of phosphate rock that were held by producers decreased by 1.32 Mt, a 15% drop, to end the year at 7.54 Mt (table 3). The majority of the reduction was in the Florida-North Carolina region, where stocks fell by 19%. The large decrease was a result of mining companies reducing output to lower stockpiles of phosphate rock. In Idaho and Utah, a decline of 4% was reported. Yearend stocks were equivalent to more than 2.5 months of production.

Transportation

In Florida and North Carolina, crude phosphate rock ore was sent by a slurry pipeline from the mines to the processing plant. Most beneficiated phosphate rock was used internally to manufacture wet-process phosphoric acid, and it was sent by conveyers to the acid plant. The small amount of phosphate rock that was sold to other companies in the region was delivered by rail. IMC Phosphates sent beneficiated phosphate rock by rail to the Port of Tampa, FL, and then by barge across the Gulf of Mexico to its facilities in Louisiana.

In central Florida, animal feed products, fertilizers, and phosphoric acid were sent by rail to domestic customers or to the Port of Tampa for export. The Port of Tampa handles the largest volume of fertilizer materials in the world (Florida Phosphate Council, 2003).

In northern Florida, PCS transported its fertilizer products by rail to consumers; however, some materials were sent by rail to the PCS port facility at Morehead City, NC, for export. PCS used barges and tugboats to move products from its Aurora, NC, complex to Morehead City for export or delivery by rail to domestic consumers. Phosphoric acid producers along the Gulf of Mexico received phosphate rock by ship from Morocco and transported their products by barge on the Mississippi River and its tributaries or by rail for domestic consumers. In Idaho and Utah, phosphate rock was sent from the mine to the processing facility by rail, slurry pipeline, and truck.

Prices

The weighted average annual price decreased to $26.95 per metric ton compared with $27.69 per ton in 2002 (table 5). Price data were collected on the semiannual canvass of producers and reflected the value of phosphate rock sold or used for phosphoric acid and elemental phosphorus production. The small amount that was sold (less than 3% of shipments) was done so on long-term contracts and was included in the average price. Unlike many other mineral commodities, there is no standard domestic or world price for phosphate rock. Ranges of averages prices were published in various industry trade journals based on a sample of transactions. The import price per ton was based on the U.S. Census Bureau customs value and included cost, insurance, and freight (table 1).

Foreign Trade

Phosphate rock imports were estimated to have decreased to 2.4 Mt in 2003 from 2.7 Mt in 2002 (tables 1, 12). The slight drop was attributed to lower production rates by the three companies along the Gulf of Mexico—Agrifos, Mississippi Phosphates, and PCS Nitrogen—that imported phosphate rock from Morocco. Phosphate rock import data were derived from U.S. Census Bureau monthly reports and export data provided by the Moroccan producer. The second source was needed because the U.S. Census Bureau withheld tonnage and value data for a significant percentage of phosphate rock imports from Morocco, which accounted for 99% of phosphate rock imports.

In 2003, phosphate rock exports amounted to a few small shipments, and the tonnage and value were withheld to protect company proprietary information. U.S. Census Bureau data were much higher owing to the inclusion of reexports of phosphate rock (table 6).

The United States was the leading exporter of phosphate fertilizers in the world, accounting for about 58% of world P_2O_5 exports (Phosphate and Potash Insight, 2004). In 2003, only MAP exports reported an increase in tonnage, on the strength of sales to South

America, primarily Brazil (table 9). U.S. exports of DAP fell slightly from 2002, with exports to China dropping by more than 30%; however, sales to India and South America increased substantially in 2003 (tables 7-10). China remained the top destination for U.S. processed phosphate exports, accounting for about 25% in terms of P_2O_5 content (Prud'homme, 2003). Elemental phosphorus exports were 8,740 t, down from 10,600 t in 2002 (table 11).

World Review

World production of marketable phosphate rock was 137 Mt, a slight increase compared with 2002 (table 14). The United States, China, and Morocco, in descending order of production, remained the top three producing countries, accounting for 60% of production. Brazil, China, and Egypt showed significant increases owing to expansion of indigenous phosphate fertilizer production. World phosphate rock trade was estimated to have been slightly lower than in 2002 because of several factors—a general trend to export processed phosphate products; the temporary closure of the leading fertilizer plant in India; expansion of processed phosphate plants in Africa, Asia, and South America; and lower demand in Western Europe and the United States (Prud'homme, 2003).

World phosphate fertilizer consumption was estimated to have increased slightly in 2003 according to estimates from the International Fertilizer Industry Association (IFA). In decreasing order, the leading consumers of P_2O_5 contained in fertilizers were China, India, the United States, and Brazil (Heffer, 2003).

China.—The Chinese phosphate industry continued to show growth in production of phosphate rock and high-analysis phosphate fertilizers. From 1992 to 2002, Chinese phosphate fertilizer production increased at a rate of 5.9%; consequently, the country's need for imports has been reduced to 15% of demand from 30% during the same period. In 2003, imports of DAP chiefly from the United States fell by 30% owing to higher domestic production. Despite relying on imports to supply part of its requirements, exports of DAP increased because of regional issues. Larger producers in southern China exported to Southeast Asia, while imports were directed to northern China (Lin, 2003).

India.—Imports of DAP more than doubled from those of 2002 owing to technical problems at the Oswal Chemical DAP facility, the leading in the country, and lower production at other plants because of high raw material costs. U.S. producers accounted for about 60% of the DAP imported into India, which amounted to 613,000 t compared with 201,000 t in 2002. Anticipated lower production owing to maintenance at the Oswal plant may result in higher imports in 2004, which would benefit U.S. manufacturers (Prud'homme, 2003).

Outlook

The short-term outlook for domestic phosphate rock production and consumption shows a steady increase based on projections of domestic and world demand for phosphate fertilizers. The IFA projected that global fertilizer consumption would grow at a rate of 2.5% in 2004, with phosphates showing the largest growth of the three primary nutrients. As the leading consumer and importer of phosphate fertilizers, China will continue to be the primary factor in the world market and the primary destination for U.S. exports. An additional 3 Mt/yr of P_2O_5 in production capacity planned for the next 2 years in China may adversely affect U.S. export sales. However, transportation issues within China, World Trade Organization import quotas, and the time necessary before the new facilities can become operational may lessen the impact.

Strong sales of MAP were expected in Brazil and other South American countries. This region has emerged as the second leading export market for U.S. producers. Some sales were lost in Asia and Oceania because of the building of phosphoric- acid plants in the region during the past decade.

U.S. phosphate rock production was expected to increase slightly in 2004 owing to a slight rise in phosphoric acid production and lower inventories of phosphate rock. U.S. capacity was expected to remain level during the next 5 years, then probably fall, with new mines scheduled to replace some existing mines and other mines exhausting reserves. Permitting procedures for new mines in Florida may delay the opening of new mines or the expansion of existing mines. Combined with industry consolidation, this may result in imported phosphate rock from Morocco being used in Florida to sustain fertilizer production rates.

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TABLE 1

SALIENT PHOSPHATE ROCK STATISTICS[1]

(Thousand metric tons and thousand dollars unless otherwise specified)

		1999	2000	2001	2002	2003
United States:						
Mine production (crude ore)		161,000	163,000	130,000	154,000	153,000
Marketable production:						
Gross weight		40,600	38,600	31,900	36,100	35,000
P_2O_5 content		11,800	11,200	9,230	10,700	10,300
Value		1,240,000	932,000	856,000	993,000	946,000
Value, average[2]	dollars per metric ton	30.56	24.14	26.82	27.47	27.01
Sold or used by producers:[3]						
Gross weight		41,600	37,400	32,800	34,700	36,400
P_2O_5 content		12,100	10,900	9,500	10,300	10,600
Value[4]		1,310,000	909,000	879,000	962,000	981,000
Value, average	dollars per metric ton	31.49	24.29	26.81	27.69	26.95
Exports:						
Gross weight[5]		272	299	9	62 r	64
Value[6]		11,400	12,100	W	W	W
Value, average	dollars per metric ton	41.96	40.38	W	W	W
Imports for consumption[e, 5,7]						
Quantity		2,170	1,930	2,500	2,700	2,400
Value, cost, insurance, and freight[e]		123,000	99,800	123,000	112,000	84,000
Value, average	dollars per metric ton	56.54	51.75	49.30	41.45	35.55
Consumption[e, 8]		43,500	39,000	35,300	37,400	38,800
Stocks, December 31, producers		6,920	8,170	7,510	8,860	7,540
World, production, gross weight		134,000	132,000	126,000	135,000	137,000 e

[e]Estimated. [r]Revised. W Withheld to avoid disclosing company proprietary data.

[1]Data are rounded to no more than three significant digits, except average values per metric ton.

[2]Average value based on the sold or used values.

[3]Includes domestic sales and exports.

[4]Total value of all domestic and export sales.

[5]Source: U.S. Census Bureau.

[6]Reported by producers.

[7]Includes some estimated phosphate rock tonnage imported from Morocco but not reported by the U.S. Census Bureau.

[8]Expressed as sold or used plus imports minus exports.

TABLE 2
ACTIVE PHOSPHATE ROCK MINES IN THE UNITED STATES IN 2003

Owner	Mine	County and State
Cargill Crop Nutrition.	Hookers Prairie	Polk, FL.
Do.	South Fort Meade	Do.
CF Industries, Inc.	South Pasture	Hardee, FL.
IMC Phosphates MP Inc.	Fort Green	Polk, FL.
Do.	Four Corners	Hillsborough/Manatee/Polk, FL.
Do.	Hopewell	Hillsborough, FL.
Do.	Kingsford	Polk/Hillsborough, FL.
Nu-West Industries, Inc. (Agrium US, Inc.)	Rasmussen Ridge	Caribou, ID.
P4 Production LLC. (Monsanto Co.)	Enoch Valley	Do.
PCS Phosphate Co., Inc.	Aurora	Beaufort, NC.
Do.	Swift Creek	Hamilton, FL.
J.R. Simplot Co.	Smoky Canyon	Caribou, ID.
Do.	Vernal	Uintah, UT.

TABLE 3

PRODUCTION OF PHOSPHATE ROCK IN THE UNITED STATE, BY REGION[1]

(Thousand metric tons and thousand dollars)

	Mine production, crude ore		Marketable production, beneficated			
Period/region	Rock	P_2O_5 content	Rock	P_2O_5 content	Value[2]	Ending stocks, rock
2002:						
Florida and North Carolina	147,000	11,000	31,100	9,320	878,000	6,560
Idaho and Utah	6,500	1,500	5,040	1,380	115,000	2,300
Total	154,000	12,500	36,100	10,700	993,000	8,860
2003:						
January-June:						
Florida and North Carolina	74,400	6,820	15,000	4,430	415,000	5,900
Idaho and Utah	3,280	722	2,310	685	53,300	2,030
Total	77,700	7,540	17,300	5,120	469,000	7,930
July-December:						
Florida and North Carolina	72,000	6,670	15,100	4,480	419,000	5,340
Idaho and Utah	3,590	777	2,580	662	58,400	2,200
Total	75,600	7,450	17,700	5,140	477,000	7,540
Grand total	153,000	15,000	35,000	10,300	946,000	XX

XX Not applicable.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Based on the per ton sold or used values.

TABLE 4
PHOSPHATE ROCK SOLD OR USED BY PRODUCERS IN THE UNITED STATES, BY GRADE AND REGION[1]

(Thousand metric tons and thousand dollars)

Period and grade [percentage of bone phosphate of line (BPL) content[2]]	Rock	P_2O_5 content	Value[3]
2002:			
Florida and North Carolina	29,800	8,910	840,000
Idaho and Utah	4,920	1,350	122,000
Total	34,700	10,300	962,000
2003:			
January-June:			
60 to less than 66	17,300	5,040	463,000
Other[4]	982	305	28,700
Total	18,200	5,340	492,000
July-December:			
60 to less than 66	15,800	4,580	419,000
Other[4]	2,410	671	70,400
Total	18,200	5,250	490,000
Grand total	36,400	10,600	981,000
Florida and North Carolina	31,300	9,190	865,000
Idaho and Utah	5,110	1,400	116,000
Total	36,400	10,600	981,000

[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]1.0% BPL (tricalcium phosphate)=0.458% phosphorus pentoxide (P_2O_5).
[3]Free on board mine.
[4]Includes less than 60% and greater than 66% BPL content.

TABLE 5
VALUE OF U.S. PHOSPHATE ROCK, BY GRADE

(Dollars per metric ton, free on board mine)

Grade	2002			2003		
[percentage of bone phosphate of line (BPL) content[1]]	Domestic	Export	Average	Domestic	Export	Average
70 to less than 72	W	W	W	W	W	W
66 to less than 70	25.90	--	25.90	28.57	--	28.57
60 to less than 66	27.35	--	27.35	26.75	--	26.75
Average weighted[2]	27.69	W	27.69	26.95	W	26.95

W Withheld to avoid disclosing company proprietary data. -- Zero.

[1]1.0% BPL (tricalcium phosphate)=0.458% phosphorus pentoxide.

[2]Includes less than 60% and greater than 72%, in addition to the grades listed.

TABLE 6
U.S. EXPORTS OF GROUND AND UNGROUND PHOSPHATE ROCK[1]

(Thousand metric tons)

Country	2002[r]	2003
Canada	26	32
El Salvador	--	5
Japan	4	6
Trinidad and Tobago	9	(2)
Other	23	21
Total	62	64

[r]Revised. -- Zero.
[1]Includes reexports.
[2]Less than 1/2 unit.

Source: U.S. Census Bureau.

TABLE 7
U.S. EXPORTS OF SUPERPHOSPHATES
(CONCENTRATED)

(Thousand metric tons)

Country	2002	2003
Argentina	39	33
Australia	110	81
Bangladesh	63	49
Brazil	198	213
Chile	48	22
Cote d'Ivoire	8	23
Japan	42	32
Other	41 [r]	59
Total	549 [r]	512

[r]Revised.

Source: U.S. Census Bureau.

TABLE 8
U.S. EXPORTS OF DIAMMONIUM PHOSPHATE[1]

(Thousand metric tons)

Country	2002	2003
Argentina	105	290
Australia	214	205
Brazil	43	160
Canada	239	185
China	3,680 r	2,550
Colombia	131	126
Guatemala	2	74
India	201	613
Japan	309	322
Kenya	77	86
Mexico	430	401
New Zealand	84	72
Pakistan	149	276
Peru	66	85
Thailand	98	177
Vietnam	132	98
Other	283 r	433
Total	6,240 r	6,160

[r]Revised.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

Source: U.S. Census Bureau.

TABLE 9

U.S. EXPORTS OF MONOAMMONIUM PHOSPHATE[1]

(Thousand metric tons)

Country	2002	2003
Argentina	98	180
Australia	550	639
Brazil	537	861
Canada	435	630
Chile	73	106
Colombia	108	127
Japan	128	119
Mexico	110	159
Other	168 r	103
Total	2,210	2,920

[r] Revised.

[1] Data are rounded to no more than three significant digits; may not add to totals shown.

Source: U.S. Census Bureau.

TABLE 10

U.S. EXPORTS OF PHOSPHORIC ACID[1]

(Thousand metric tons)

Country	2002	2003
Australia	17	(2)
Brazil	112	53
Canada	46	42
Colombia	4	1
Mexico	8	8
Other	1 r	2
Total	187	106

[r]Revised.

[1]Excludes superphosphoric acid tonnage.

[2]Less than 1/2 unit.

Source: U.S. Census Bureau.

TABLE 11

U.S. EXPORTS OF ELEMENTAL PHOSPHORUS[1]

Country	2002 Quantity (metric tons)	2002 Value[2] (thousands)	2003 Quantity (metric tons)	2003 Value[2] (thousands)
Brazil	7,150	$21,100	7,540	$16,200
Canada	698	1,580	689	1,490
China	2	10	39	73
Japan	38	81	60	117
Korea	5	15	112	217
Mexico	2,500	5,030	120	236
Malaysia	19	37	113	267
Taiwan	133	253	12	23
Other	51 r	106 r	52	163
Total	10,600	28,200	8,740	18,800

[r] Revised.

[1] Data are rounded to no more than three significant digits; may not add to totals shown.

[2] Free alongside ship values.

Source: U.S. Census Bureau.

TABLE 12

U.S. IMPORTS FOR CONSUMPTION OF PHOSPHATE ROCK AND PHOSPHATIC MATERIALS[1]

(Thousand metric tons and thousand dollars)

Phosphatic materials	2002		2003	
	Quantity	Value[2]	Quantity	Value[2]
Phosphate rock:				
Unground[3]	730	22,300	828	21,200
Ground[3]	595	32,700	460	23,900
Phosphate rock[4]	2,700	112,000	2,400	84,000
Dicalcium phosphate	6	6,400	6	7,090
Elemental phosphorus	34	50,900	16	23,600
Normal superphosphate	8	1,220	1	175
Triple superphosphate	29	3,500	33	4,960
Diammonium phosphate	156	32,800	142	30,700
Fertilizer containing nitrates and phosphates	3	835	26	5,270
Phosphoric acid	18	10,200	51	20,100

[1]Data are rounded to no more than three significant digits.

[2]Declared cost, insurance, freight values.

[3]Some phosphate rock tonnages and values were suppressed by the U.S. Census Bureau.

[4]Includes an estimate for data suppressed by the U.S. Census Bureau based on reported Moroccan exports to the United States.

Source: U.S. Census Bureau.

TABLE 13
PHOSPHATE ROCK ANNUAL WORLD
PRODUCTION CAPACITY, DECEMBER 31, 2003[1]

(Thousand metric tons)

Region/country	Capacity
Africa	51,400
Asia	33,600
Europe and Russia	14,200
Middle East	15,300
Latin America and Canada	8,500
Oceania	2,800
United States	43,900
Total	170,000

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

Sources: International Fertilizer Industry Association and U.S. Geological Survey.

TABLE 14

PHOSPHATE ROCK, BASIC SLAG, AND GUANO: WORLD PRODUCTION, BY COUNTRY[1, 2]

(Thousand metric tons)

Commodity and country	Gross weight					P_2O_5 content				
	1999	2000	2001	2002	2003[e]	1999	2000	2001	2002	2003[e]
Phosphate rock:										
Albania[e]	1	1	1	1	--	(3)	(3)	(3)	(3)	--
Algeria	1,096	877	939 [r]	740 [r]	905 [4]	340	265	280	230 [r]	280
Australia	2	977	1,893	2,025	2,285 [4]	(3)	225	438	482	545 [4]
Brazil, concentrate	4,344	4,725	4,805	4,883 [r]	5,600	1,543	1,687	1,708	1,738 [r]	1,990
Burkina Faso	NA	NA	1	2	2	NA	NA	(3)	1	1
Canada[e]	--	300	800	1,000	1,000	--	125	300	380	380
Chile, including phosphorite	16 [r]	19 [r]	19 [r]	20 [r]	20	5 [r]	5 [r]	5 [r]	5 [r]	5
China[e]	20,000	19,400	21,000	23,000	24,500	6,000	5,820	6,300	6,900	7,350
Christmas Island	650	590	568	500 [e]	500	220	197	190	167 [e]	167
Colombia	43	43	43 [r, e]	43 [r, e]	43	8	8	8	8 [e]	8
Egypt, beneficiated	1,018	1,096	972	1,500 [e]	2,140	298	317	293	434 [e]	630
Finland[e]	724 [4]	750	750	760	770	268	277	277	280	282
India	1,262	1,136	1,200 [e]	1,250 [e]	1,180	380	336	355 [e]	370 [e]	345
Indonesia[e]	1 [4]	1	1	1	1	(3) [4]	(3)	(3)	(3)	(3)
Iraq, beneficiated[e]	1,000	650	300	300	30	300	200	100	100	10
Israel	4,128	4,110	3,511	3,476 [r]	3,210	1,310	1,305	1,115	1,110 [e]	1,020
Jordan	6,014	5,526	5,843	7,179	6,763 [4]	1,924	1,824	1,928	2,340 [r]	2,200
Kazakhstan	68	33	97 [r]	137 [r]	120 [4]	20	10	28 [r]	40 [r]	35 [4]
Korea, North[e]	350	350	350	300 [r]	300	105	105	105	95 [r]	95
Mexico	951	1,052	787	(3) [r]	--	285	316	236	(3) [r]	--
Morocco[5]	22,163	21,463	21,983	23,041 [r]	23,000	7,500	7,200	7,400	7,700 [r]	7,700
Nauru	604	504	266	150 [e]	84	234	194	100	55 [e]	26
Pakistan[e]	12	11	11	11	11	2	2	2	2	2
Peru	25 [e]	17 [e]	16 [e]	16 [e]	16	9	6	5	6 [r]	6
Philippines[e]	181 [4]	434 [4]	450	400	400	60	143	148	135	135
Russia[e]	11,400	11,100	10,500	10,700	11,000	4,200 [r]	4,100 [r]	3,900 [r]	4,000 [r]	4,000
Senegal	1,814	1,739	1,708	1,547 [r]	1,472 [4]	600 [r]	462	582	520 [r]	500
South Africa	2,957	2,796	2,420	2,803 [r]	2,643 [4]	1,153	1,083 [r]	995 [r]	1,086 [r]	1,030
Sri Lanka	32	34	35 [r]	39 [r]	39	11	12	12	13	13
Syria	2,084	2,166	2,043	2,483 [r]	2,430	635 [e]	646 [e]	613 [e]	745 [r, e]	725
Tanzania	24	17	13	26 [r]	26	7	5	4	8 [r]	8
Thailand	4	3	2 [r]	4	3	1	1 [e]	1 [e]	1 [e]	1
Togo	1,600	1,400	1,060	1,281	1,480	600	500 [e]	380 [e]	460 [e]	530
Tunisia, washed	8,006	8,339	8,144	7,735 [r]	7,890	2,400	2,500 [e]	2,440 [r, e]	2,300 [e]	2,300
United States	40,600	38,600	31,900	36,100	35,000 [4]	11,800	11,200	9,230	10,700	10,600 [4]
Uzbekistan[e]	150	150	200	425 [r]	430	36 [r]	36 [r]	47 [r]	101 [r]	102
Venezuela	366	389	399	393 [r, e]	400	99	105	114 [e]	110 [r, e]	114
Vietnam	681	785 [r]	750 [e]	770 [r, e]	760	204	236 [r]	225 [e]	230 [r, e]	227
Zimbabwe, concentrate	126	78	87	108 [r]	90	40	25	28	39 [r]	33
Total	134,000	132,000	126,000	135,000	137,000	42,600 [r]	41,500 [r]	39,900 [r]	42,900 [r]	43,400

See footnotes at end of table.

TABLE 14--Continued

PHOSPHATE ROCK, BASIC SLAG, AND GUANO: WORLD PRODUCTION, BY COUNTRY[1, 2]

(Thousand metric tons)

Commodity and country	Gross weight					P_2O_5 content				
	1999	2000	2001	2002	2003[e]	1999	2000	2001	2002	2003[e]
Basic (Thomas converter) slag:[e]										
Argentina	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)
Egypt	7	7	7	7	7	2	2	2	2	2
France	50	50	50	50	50	8	8	8	8	8
Germany	150	150	150	150	150	19	18	18	18	18
Luxembourg	475	475	475	475	475	75	75	75	75	75
Total	682	682	682	682	682	104	103	103	103	103
Guano, Philippines[e]	5	-- [4]	--	--	--	2	-- [4]	--	--	--

[e]Estimated. [r]Revised. -- Zero.

[1]World totals, U.S. data, and estimated data are rounded to no more than three significant digits; may not add to totals shown.

[2]Table includes data available through May 7, 2004. Data for major phosphate rock-producing countries derived in part from the International Fertilizer Industry Association; other figures are from official country sources where available.

[3]Less than 1/2 unit.

[4]Reported figure.

[5]Includes production from Western Sahara.